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Contents: Pollution Prevention and Waste Minimization

 Effective Date: **May 2003**

 Point of Contact: [Pollution Prevention Coordinator](#)

Section	Overview of Content (see section for full process)
Introduction	
1. Planning and Designing Work to Minimize Waste	<ul style="list-style-type: none"> • Identify wastes that will be generated during work. • Investigate opportunities for pollution prevention, waste minimization, and resource conservation. • Incorporate identified techniques into work.
2. Purchasing Products with Recycled Content	<ul style="list-style-type: none"> • Purchase products with specified recycled contents.
3. Reducing Waste in Work	<ul style="list-style-type: none"> • Identify all wastes, effluents, and emissions in work plans. • Implement practices that eliminate or reduce waste generation. • Segregate wastes and recycle in designated containers. • Reuse, recycle, or dispose of wastes according to work plans.

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None

Training Requirements and Reporting Obligations

This subject area does not contain training requirements.

This subject area does not contain reporting obligations.

References

[BNL's Affirmative Procurement Program](#), [Procurement and Property Management](#) Web site

[Chapter 1. General Procurement Information](#), [Procurement Operations Manual](#)

[Chemical Management System](#)

[Comprehensive Procurement Guidelines](#), [U.S. Environmental Protection Agency](#) Web site

[Engineering Design](#) Subject Area

[EnviroSense](#), [U.S. Environmental Protection Agency](#) Web site

[Hazardous Waste Management](#) Subject Area

[Mixed Waste Management](#) Subject Area

[Pollution Prevention](#) Web site

[Radioactive Waste Management](#) Subject Area

[Radiological Control Manual](#) Program Description

[Regulated Medical Waste Management](#) Subject Area

[Work Planning and Control for Experiments and Operations](#) Subject Area

Standards of Performance

All staff and guests shall comply with applicable Laboratory policies, standards, and procedures, unless a formal variance is obtained.

Managers shall ensure that work is planned to prevent pollution, minimize waste, and conserve resources, and that work is conducted in a cost-effective manner that eliminates or minimizes environmental impact.

All staff and users shall identify, evaluate, and control hazards in order to ensure that work is conducted safely and in a manner that protects the environment and the public.

All staff and users shall ensure that environmental effluents, emissions, and wastes associated with their work are as low as reasonably achievable (also referred to as "E-ALARA").

Management System


This subject area belongs to the **Environmental Management System** management system.

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Introduction: Pollution Prevention and Waste Minimization

Effective Date: **May 2003**

Point of Contact: [Pollution Prevention Coordinator](#)

This subject area describes how staff plan, conduct, and closeout their work to eliminate or minimize the impact to the environment. The following topics are discussed in this subject area:

- Reducing or eliminating wastes, effluents, and emissions;
- Conserving natural resources;
- Procuring recycled products;
- Reusing or recycling materials.

Brookhaven National Laboratory (BNL) is committed to integrating environmental stewardship into all facets of its mission. This stewardship includes integrating pollution prevention, waste minimization, resource conservation, and environmental compliance into all of planning and decision-making. Cost-effective practices are used to eliminate, minimize, or mitigate environmental impacts.

This subject area implements, in part, the Laboratory's Policies and Standards of Performance related to environment, safety, and health commitments.

Although this subject area discusses the waste-minimization aspects of the following topics, it does not address their full scope; that information is detailed elsewhere:

- The management, permitting, or disposal of wastes, effluents, and emissions (see also BNL environmental compliance subject areas);
- The general procurement process (see [Chapter 1. General Procurement Information](#), [Procurement Operations Manual](#));
- The management of all the aspects of projects, experiments, and other work. (See the [Work Planning and Control for Experiments and Operations](#) Subject Area).

The Laboratory's goal for pollution prevention/waste minimization is resource conservation (increase efficiency of energy and water use), and to decrease facility wastes, effluents, and emissions over time, including the following items:

- The quantities (by weight) of solid waste (trash) sent to the landfill.
- The quantities of hazardous, radioactive, and mixed waste that are generated at BNL.
- The total airborne and waterborne radiological and non-radiological contamination.


In addition, Department-level goals are being developed that support these Laboratory goals.

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Subject Area: **Pollution Prevention and Waste Minimization**

1. Planning and Designing Work to Minimize Waste

Effective Date: **May 2003**

Point of Contact: [Pollution Prevention Coordinator](#)

Applicability

This information applies to BNL staff and non-BNL staff who plan and design projects, experimental work, and all other types of work.

Required Procedure

Step 1	The Responsible Individual identifies any wastes, effluents, and emissions that will be generated and/or natural resource consumption during the project, experiment, or other activity so that they can be minimized to the extent practicable.
Step 2	Determine the costs for managing and disposing of the wastes, effluents, and emissions. Ensure that adequate funding is available for waste disposal. If additional funding is needed, seek approval for funding prior to the start of the work.
Step 3	<p>Investigate opportunities for pollution prevention, waste minimization, and resource conservation. See Pollution Prevention Techniques for types of activities to consider.</p> <p>Note: Contact your Environmental Compliance Representative (ECR) or the Pollution Prevention Coordinator for assistance in identifying pollution-prevention opportunities.</p> <p>Note: Funding is often available to support cost-effective ways to minimize waste and prevent pollution. See the Pollution Prevention Web page for more information.</p>
Step 4	<p>Incorporate technically and economically feasible techniques for pollution prevention, waste minimization, or resource conservation into your work-planning activities.</p> <ul style="list-style-type: none"> For experiments, document the techniques in the ES&H review of the experiment (see the Work Planning and Control for Experiments and Operations Subject Area). For projects, document the techniques in the project plan (see the Work Planning and Control for Experiments and Operations Subject Area). For new facility designs or facility modifications, incorporate pollution-prevention techniques into design specifications (see the Engineering Design Subject Area). For other work, document the techniques in any written plans or other documents (see Work Planning and Control for Experiments and Operations Subject Area). For purchasing products with recycled content, see the section Purchasing Products with Recycled Content.

Guidelines

A Pollution Prevention Opportunity Assessment (PPOA) can be conducted to identify ways to minimize waste and prevent pollution. Funding often is available to conduct the assessment. For additional information, contact the [Pollution Prevention Coordinator](#) or see the [Pollution Prevention](#) Web page.

References

[Engineering Design](#) Subject Area

[Pollution Prevention](#) Web page

[Work Planning and Control for Experiments and Operations](#) Subject Area

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2. Purchasing Products with Recycled Content

Effective Date: **May 2003**

Point of Contact: [Pollution Prevention Coordinator](#)

Applicability

This information applies to BNL and non-BNL staff who purchase products with recycled content.

Required Procedure

The US EPA established criteria for purchasing specific products with specified recycled contents. See the [Comprehensive Procurement Guidelines, U.S. Environmental Protection Agency](#) Web site. If the Responsible Person is ordering via one of the Laboratory's E-mail web-based vendors, e.g., Corporate Express, or through the Laboratory's on-site warehouse, these criteria are being met. For example, when purchasing paper (including all forms of office paper, cover stock, envelopes, and manila folders), products should contain no less than 30% post-consumer or 50% recycled content.

All staff are required to practice preferable purchasing by taking the following actions.

Step 1	<p>When purchasing equipment or materials outside of the E-mail or warehouse inventory, review the Comprehensive Procurement Guidelines, U.S. Environmental Protection Agency Web site to check the product's required recycled content. The preference is to procure products that contain recycled materials. Exceptions are those products that do not meet the C.A.P. (cost, availability, or performance). For example, a recycled concrete mix may not meet one of these criteria). For additional information see BNL's Affirmative Procurement Program, Procurement and Property Management Web site.</p> <p>For assistance, contact the Pollution Prevention Coordinator.</p>
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Guidelines

Before purchasing new equipment or materials, look for existing equipment or material that is available for reuse from the following sources:

- Within your own group;
- Outside your immediate group (e.g., the Laboratory's [Chemical Management System](#) or Supply and Materiel);
- Outside the Laboratory (e.g., the [EnviroSense, U.S. Environmental Protection Agency](#) Web site).

In all situations, consider purchasing and using environmentally preferable products and products that are designed to minimize the use of natural resources and waste generation. Governmental Comprehensive

Procurement (Green) Guidelines are established by the US EPA listing designated products and their accompanying recommended recycled-content. These lists currently include the following eight categories:

- Construction Products;
- Landscaping Products;
- Nonpaper Office Products;
- Paper and Paper Products;
- Park and Recreation Products;
- Transportation Products;
- Vehicular Products;
- Miscellaneous Products.

See the [Comprehensive Procurement Guidelines, U.S. Environmental Protection Agency](#) Web site for complete lists.

References

[BNL's Affirmative Procurement Program](#), [Procurement and Property Management](#) Web site

[Chemical Management System](#)

[Comprehensive Procurement Guidelines, U.S. Environmental Protection Agency](#) Web site

[EnviroSense, U.S. Environmental Protection Agency](#) Web site


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3. Reducing Waste in Work

Effective Date: **May 2003**

Point of Contact: [Pollution Prevention Coordinator](#)

Applicability

This information applies to all BNL staff and non-BNL staff as they conduct their normal work.

Required Procedure

All staff take the following actions.

Step 1	The Responsible Individual ensures that work plans have adequately identified all wastes, effluents, and emissions.
Step 2	Implement work practices that eliminate or reduce the generation wastes, effluents, and emissions. See the exhibit Pollution Prevention Techniques for types of activities to consider.
Step 3	Appropriately segregate wastes that are generated (e.g., nonhazardous materials from hazardous materials and nonradioactive materials from radioactive materials). See the Radiological Control Manual Program Description, and the following subject areas: Hazardous Waste Management , Radioactive Waste Management , Regulated Medical Waste Management , and Mixed Waste Management .
Step 4	Recycle office waste in designated containers. For information on recycling office wastes, see the Pollution Prevention web page.
Step 5	While conducting experiments or projects, ensure that all hazardous materials are properly labeled and identified. Reuse, recycle, or dispose of all wastes appropriately in accordance with your project, experiment, or work plan.

Guidelines

Before purchasing new equipment or materials, look for existing equipment or material that is available for reuse from the following sources:

- Within your own group;
- Outside your immediate group (e.g., the Laboratory's [Chemical Management System](#) or Supply and Materiel);
- Outside the Laboratory.

In all situations, consider purchasing and using environmentally preferable products and products that are

designed to minimize the use of natural resources and waste generation.

If you have made significant strides in minimizing waste, preventing pollution, or conserving natural resources, you can report those successes through the Pollution Prevention Web page. Information that is submitted will be used to document the Laboratory's success in meeting its waste minimization goals.

A Pollution Prevention Opportunity Assessment (PPOA) can be conducted to identify ways to minimize waste and prevent pollution. Funding often is available to conduct the assessment. For additional information, contact the [Pollution Prevention Coordinator](#) or see the [Pollution Prevention](#) Web site.

References

[Chemical Management System](#)

[Hazardous Waste Management](#) Subject Area

[Mixed Waste Management](#) Subject Area

[Pollution Prevention](#) Web site

[Radioactive Waste Management](#) Subject Area

[Regulated Medical Waste Management](#) Subject Area

[Radiological Control Manual](#) Program Description


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Pollution Prevention Techniques

Effective Date: **May 2003**

Point of Contact: [Pollution Prevention Coordinator](#)

Preventing pollution, minimizing waste, and conserving resources can save money, time and effort while creating a safer workplace. Some of the techniques that should be considered are listed below.

- Conduct a Pollution Prevention Opportunity Assessment (PPOA) of the process to identify any techniques that could reduce or eliminate wastes. A PPOA is a systematic evaluation that uses a number of structured problem-solving and decision making tools that will identify pollution prevention opportunities and determine cost effectiveness (contact the [Pollution Prevention Coordinator](#) or ECR for assistance).
- Use materials that are less hazardous by substituting more environmentally friendly products for hazardous ones. Material substitution techniques are particularly useful in part washing operations.
- Purchase only the amounts needed. Investigate availability of excess materials before procuring new hazardous materials.
- Label hazardous materials and segregate hazardous materials from non-hazardous materials.
- Investigate ways to modify processes or procedures to generate less waste.
- Consider microscale chemical techniques that use only very small samples and small amounts of chemicals. Microscale glassware and instrumentation has been developed for many common analytical procedures.
- Investigate ways to reuse or recycle materials within your workgroup, or in coordination with other groups.
- When several products meet your needs, select the one with the least environmental impact.
- Conduct a life-cycle cost analysis on major equipment before purchase.

For radiological operations:

- Segregate and label radioactive materials by using conspicuous color-coding.
- When possible, select radionuclides with short half-lives.
- Don't simply assume all materials in radiological areas are contaminated. Survey the area and segregate clean materials.
- Decontaminate wastes that are radioactive due to removable surface contamination by wiping, washing, or other means (if the resulting decontamination wastes are less volume than the original contaminated item).
- When items are partially contaminated, consider cutting out only the contaminated portion for radioactive disposal.
- Use reusable protective clothing (e.g., lab coats or rubber booties) that can be cleaned and reused.
- Convert laboratory processes that generate mixed or low-level radioactive waste to microscale.
- Consider non-radiological procedures (e.g., chemoluminescent procedures) to replace radiological procedures
- Neutralize radioactive acids or bases to a pH between 6 and 8; if the pH was the only characteristic making the waste a mixed waste they then can be disposed of as low-level radioactive waste.
- For liquid scintillation counting, use 7-ml mini-vials instead of 20-ml vials to achieve a three-fold reduction in LSC waste generation.
- Consider using 'biodegradable' liquid scintillation fluid instead of pseudocumene-based cocktails. New biodegradable cocktails are less toxic, non-flammable and not regulated as mixed waste (wastes still must be collected for disposal).
- Use lead-free solder and low-mercury fluorescent bulbs in activation areas.


- Use lead-free solder and low-mercury fluorescent bulbs in activation areas.

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Definitions: Pollution Prevention and Waste Minimization

Effective Date: **May 2003**

Point of Contact: [Pollution Prevention Coordinator](#)

Term	Definition
Chemical Management System	A database that tracks surplus chemicals stored across the BNL site that are available for use by others instead of purchasing new materials. For more information, see the Chemical Management System (CMS) Web site.
design for environment	The process by which resource conservation and pollution prevention are considered during the design of an experiment, project, or other work activity, and are designed into the product or service.
effluent	Any treated or untreated liquid discharge from an experiment, laboratory, process, or building. (Note: This may include storm-water run-off.)
emission	Any treated or untreated discharge to the atmosphere from an experiment, laboratory, process, or building.
environmentally preferable buying	The process by which products with recycled content are purchased in lieu of other products containing no recycled content. The BNL goal is to purchase 100% of the recycled products designated by the U.S. Environmental Protection Agency if the product meets cost, availability, and performance criteria.
hazardous waste	By-product of certain BNL processes and activities that can pose a substantial or potential hazard to human health or the environment when improperly managed. Hazardous waste possesses at least one of four characteristics (ignitability, corrosivity, reactivity, and toxicity), or appears on special EPA lists.
life-cycle cost	The cost of a piece of equipment or material from creation through use and disposal.
pollution prevention	<p>Source reduction and other practices that reduce or eliminate the creation of pollutants through</p> <ul style="list-style-type: none"> Increased efficiency in the use of raw materials, energy, water, or other resources; Protection of natural resources by conservation. <p>Pollution prevention techniques include measures such as material substitution, process changes, inventory control, preventative maintenance, and improved housekeeping.</p>
Pollution Prevention Opportunity Assessment (PPOA)	A systematic evaluation and appraisal of a process, activity, or operation to identify potential opportunities to reduce or eliminate wastes, effluents and/or emissions. For more information on the PPOA program, see the Pollution Prevention Web site.
Pollution Prevention	A program that includes preventing or reducing the generation of pollutants,

Program	contaminants, hazardous substances, or wastes at the source, as well as reducing the amount of waste for treatment, storage, and disposal through reuse or recycling. For more information, see the Pollution Prevention Web site.
Responsible Individual	The individual within a Department/Division responsible for evaluating the work (i.e., process or experiment) for pollution prevention/waste minimization opportunities.
source reduction	The reduction or prevention of a hazardous substance, pollutant, or contaminant from entering a waste stream or otherwise from being released to the environment before recycling or treatment.
waste minimization	An approach that focuses on preventing or reducing the generation of pollutants, contaminants, hazardous substances, or wastes. Techniques of waste minimization focus on reuse, volume reduction, and recycling.

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Revision History: Pollution Prevention and Waste Minimization

Point of Contact: [Pollution Prevention Coordinator](#)

Revision History of this Subject Area

Date	Description	Management System
May 2003	<p>This subject area was revised as part of the triennial review of Environmental subject areas. The subject area was updated to directly link to the US EPA's Comprehensive Procurement Guidelines. The exhibit on Products Requiring Recycled Content was removed from this subject area and replaced with a link to this site.</p> <p>A link to the new BNL's Affirmative Procurement Program was added to the Procurement and Property Management Web site to provide staff with information on BNL's requirements and elements for purchasing products with specified recycled content.</p>	Environmental Management System
March 1999	This is a new subject area.	Environmental Management System

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